DOCUMENT RESUME

ED 172 379 EA 011 800

AUTHOR	Levin, Henry M.
TITLE	Assessing the Equalization Potential of Education.
INSTITUTION	Stanford Univ., Calif. Inst. for Research on Educational Finance and Governance.
SPONS AGENCY	National Inst. of Education (DHEW), Washington, D.C.
REPORT NO	CERAS-79-A1
PUB DATE	Feb 79
GRANT	OB-NIE-G-78-0212
NOTE	69p.; Paper presented for the Seminar on "Inequalities in Educational Development" International Institute of Educational Planning (UNESCO) (Paris, France, November 27-30, 1978)
EDRS PRICE	MF01/PC03 Plus Postage.
DESCRIPTORS	Compensatory Education; Developing Nations; Economics; Educational Benefits; Educational Policy; Elementary Secondary Education; Foreign Countries; *Human Capital; Income; Postsecondary Education; Social Change; Socioeconomic Status
IDENTIFIERS	El Salvador; Redistribution of Wealth

ABSTRACT

The human capital concept of neoclassical economics holds that increased education will lead to increased productivity and to higher wages. Job queue and labor market segmentation theories argue that improved education merely drives up employment criteria and that the socioeconomic background of the employee is a more significant indicator of earning potential. Marxist theory claims that education is a training process for the capitalistic system, which uses disparate wages simply as a means to structure and control the work force. With these concepts as a background, the author of this document conducted a research project intended to produce a methodology for predicting the potential effects of various educational strategies on the equalization of earned income among males. The method, described in this document, depends on obtaining accurate responses to survey questions concerning educational attainments, backgrounds, occupations, and earnings. A test of the method in El Salvador is described. The author concludes that the impact of education on wealth equalization is far less than has been traditionally supposed and that attempts to equalize wealth through educational strategies are doomed to failure unless those strategies and goals are appropriate to the political and economic structure of the country. (Author/PGD)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

ED172379

Center for Educational Research at Stanford

Institute for Research on Educational Finance and Governance

SCHOOL OF EDUCATION STANFORD UNIVERSITY

EA 011 800

Project Report No. 79-A1

ASSESSING THE EQUALIZATION POTENTIAL OF EDUCATION

Henry M. Levin*

February 1979

*The author is Director of the Institute for Research on Educational Finance and Governance and Professor of Education, Stanford University.

This paper was presented for the Seminar on "Inequalities in Educational Development," International Institute of Educational Planning (UNESCO), Paris, November 27-30, 1978. The research for this project was supported by funds from the National Institute of Education (Grant No. OB-NIE-G-78-0212). The analysis and conclusions do not necessarily reflect the views or policies of this organization.

THE INSTITUTE FOR RESEARCH ON EDUCATIONAL FINANCE AND GOVERNANCE

The Institute for Research on Educational Finance and Governance is a Research and Development Center of the National Institute of Education funded under the provisions of Title IV of the Elementary and Secondary Education Act of 1965. The Institute is administered through the School of Education at Stanford University and is located in the Center for Educational Research at Stanford. The research activity of the Institute is divided into the following program areas: finance and economics; politics and law; organizational sociology; concepts of equity; and historical studies. In addition, there are a number of other projects and programs in the finance and governance area that are sponsored by private foundations and government agencies outside of the special R&D Center relation with NIE.

ASSESSING THE EQUALIZATION POTENTIAL OF EDUCATION

Abstract

One of the traditional arguments for public investment in a highly egalitarian system of public education is that such an educational approach will more nearly equalize the distribution of adult earnings and income. The purpose of this paper is to review carefully the basis for this expectation as well as to set out a methodology for assessing the potential effects of various types of egalitarian educational policies on the equalization of lifetime earnings between males and females, blacks and whites, persons from different social class origins, and other groups of interest. In particular, a human capital accounting approach is used to ascertain both the average amount of human capital in each comparison population and the contribution to human capital of changes in educational attainments. On the basis of these results, different educational policies can be simulated in order to see their potential for equalizing earned income between groups as reflected in the measure of human capital. In order to illustrate the use of the method, an application is made for El Salvador, although the approach is considered to be general enough that it can be used to evaluate results for a wide variety of different populations in different national settings.

Acknowledgments

The author is grateful for the assistance of Sharon Carter in preparing the manuscript as well as for the support of the National Institute of Education in funding the research project from which this paper is derived.

CONTENTS

		Pages
I.	INTRODUCTION	1
II.	EDUCATION AND THE DISTRIBUTION OF EARNINGS	6
III.	CONCEPTUAL ISSUES	11
IV.	ANALYTICAL STEPS	21
V.	AN APPLICATION	40
VI.	SUMMARY	53
FOOTNOTES		56

I. INTRODUCTION

That prodigious economic inequalities exist in virtually all of the developing countries of the capitalist world is a fact that hardly needs documentation. Typically, a very large portion of the populations of these countries live at subsistence levels, while a small elite command income and wealth that enable them to live their lives in palatial luxury. In between is a relatively small middle class that has risen above survival levels, but that is precariously susceptible to inflation and underemployment or unemployment while being far removed from the lofty and relatively secure situation of the much smaller, wealthy elite. Typically, the poorest forty to sixty percent of the population in these countries is receiving only 10 to 15 percent of the national income, while the richest twenty percent is receiving about 40 to 60 percent and the richest five percent is receiving about 20 to 40 percent.[1]

Few independent observers would find such disparities to be equitable. But, there is less agreement on how the distribution of income and economic welfare might be improved. In the last two decades, two economic strategies have been asserted as a basis for creating greater equality. First, it was assumed that a high level of economic growth would lead to a "trickle-down" of the growth

dividend to the poorer segments of the population. Such a presumption had both the empirical support of cross-national studies of the income distribution as well as the theoretical support of neo-classical economics. In a landmark study on the relation between the distribution of income and per-capita income levels, Kuznets found a U-shaped relation.[2] Traditional societies with relatively low levels of income and modern, industrial, capitalist societies with high per-capita income levels showed more nearly equal distributions of income than those in the early stages of capitalist transformation. It was presumed that the process of capitalist transformation would require a level of capital accumulation that could only be achieved through rising inequalities. Given an equal distribution of income at a very low per-capita level, all income would be allocated to consumption with little or no savings formation. Further, there would be little incentive for entrepreneurship with its attendant inventiveness and risk-taking unless the potential rewards to the entrepreneur were substantial. Thus the explanation asserted that inequalities were necessary to establish rewards for entrepreneurship as well as to provide the source of savings for the process of capital formation necessary for economic growth.

Although inequalities would rise through the initial processes of capitalist transformation, the longer run situation was expected to be one of rising equality in that much of the growth would "trickle-down" to the poorer segments of the population. First, such growth would increase the demand for labor, reducing unemploy-

ment and underemployment of the masses. Second, the process of capital formation would create technological advances in production that would increase the productivity of labor with a resultant increase in earnings. Finally, an increasing portion of the population would shift from the relatively unproductive agricultural sector to the more productive modern sector where higher productivity and wages prevailed. Thus, both historical evidence and economic theory argued for vigorous strategies of economic growth as a solution to the problem of inequality.

A second and concommitant strategy for addressing economic inequality was the expansion of schooling. Schooling was assumed to contribute to the formation of human capital by providing the skills and productive behaviors that would increase labor productivity.[3] To the degree that the economic returns to schooling investment were equal or greater than those to investments in physical capital, the expansion of schooling would be an integral part of a strategy for economic growth. But, more than this, the expansion of schooling and educational opportunity was expected to have a powerful and direct effect on the creation of greater economic equality. At the very least it was expected that an improvement in the quality and amount of schooling of illiterates and those with the least education would tend to reduce the surplus of "undereducated" persons competing for agricultural and unskilled positions with a resulting increase in wages at that level due to a tendency toward tighter labor markets. In contrast, the increases in the supply of more highly educated persons attributible to the expansion of enrollments would tend to reduce the relative wages for educated persons vis a vis less-educated

ones by expanding the labor supply at higher educational levels.

Of course, the combination of expanded schooling in conjunction with policies to promote rapid economic growth was considered to be the best palliative of all for addressing inequality. With both effects operating on the distribution of income, it was expected that rises in per-capita income would take place simultaneously with reduction in inequality in the distribution of income. But, by the mid-seventies it became apparent that the historical data of Kuznets and the predictions of neo-classical economic theory had not been achieved for most of the developing countries of the world. In such countries as Brazil and South Korea with their prodigious expansions of schooling and rapid rates of economic growth, there has been little evidence of an improvement in the distribution of income.[4] In fact, studies of Brazil, Peru, and Mexico suggest rising inequalities in the distribution of income over time, despite rapid schooling expansion and economic growth.[5] Longitudinal comparisons of income distributions in other developing societies also suggest little or no improvement or some deterioration.[6]

At the least, we have reached a new maturity with respect to equalization policy in recognizing that the income distribution of a society is not determined by the simple and mechanical effects of economic growth and the rises in school enrollments. Further, there appears to be a large margin of economic growth that is not associated with rising equality, in spite of educational expansion and greater equality in the distribution of education. The political and economic institutions of a nation, the role of multinational

capital, the role of the government in promoting investment and high profits and providing for repatriation of capital, the legal status and stage of development of trade unionism, the degree of monopoly concentration of capital and employment, and the extent of government employment are but a few of the factors which will influence the distribution of income.

Educational Planning and Inequality

But, if the age of innocence has passed with respect to the view that educational expansion will create powerful equalizing social and economic forces, a new dilemma is posed for the educational planner. If educational planning is to be done on the basis -- at least in part -- of its impact on equalizing adult outcomes, some attempt must be made to ascertain what is the likely equalization effect of different educational alternatives. The purpose of this paper is to address this need by constructing a methodology that might be useful in assessing the potential or limit of particular educational plans for creating a more equal distribution of adult earnings. By obtaining such evaluations, it will be possible to provide a more realistic picture of what can be achieved in terms of alleviating adult inequalities, while also enabling a ranking of planning alternatives with respect to their equity implications. This effort might be viewed as a first step in setting out a general method for undertaking such evaluations.

The subsequent presentation will be organized as follows. First, we will survey briefly some theories of the relation between education and the distribution of earnings. Second, we will out-

line a set of principles and a methodology for assessing empirically the effects of education on the equalization of earnings. Third, we will show how this approach can be used to simulate the equity potential of different educational policies, and finally we will demonstrate some results that are illustrative of the types of analyses that might be addressed by this methodology.

II. EDUCATION AND THE DISTRIBUTION OF EARNINGS

In general, there are three views of the relation between education and the distribution of earnings. Each view has quite different implications for the expansion and equalization of educational outcomes and their impacts on the distribution of economic results. The human capital view perceives of education as an investment in skills of individuals.[7] Assuming perfectly competitive markets for services and products and factors of production, higher skill levels will translate into higher productivity and earnings. Accordingly, the distributional impacts of educational expansion on earnings will depend on the relative supplies of individuals with different amounts of human capital as well as the structure of demand by employers. Presumably, individuals will invest in education up to that point where the present value of the additional earnings is equal to the present value of the costs that are incurred. Firms will utilize particular levels of educated labor according to their relative wages and productivities. The expansion of the educational system should have an equalizing effect on earnings by reducing the supply of less - educated persons and increasing the supply of more-educated ones,

other things being constant. More generally, the human capital model would predict that for any earnings structure, the expansion of schooling accompanied by a reduction in qualitative and quantitative inequalities in educational results would tend to reduce the inequality of earnings.

However, two types of evidence have raised challenges to the human capital predictions. First, throughout the world there is a tendency toward greater equality in educational outcomes and toward substantial expansion of schooling enrollments without an obvious effect on the distribution of income or earnings.[8] Second, in many countries the increase in schooling has seemed to be accompanied by a rise in the level of education required by employers as well as the educational levels of the unemployed.[9] Accordingly, an alternative explanation of the relation between education and the distribution of income has emphasized education as a certificate for employment. According to Thurow, education represents one of the principal devices for placing individuals in a job queue.[10] Instead of a process of wage competition as reflected in the human capital model, there is a process of job competition in which the most educated persons are chosen for the highest paying and most productive jobs. The productivity of jobs is relatively fixed in that it is determined primarily by such factors as technology, organization, and capital investment rather than the specific talents of the worker. However, more-educated workers cost less to train than do less-educated workers, and this is the reason that employers choose the most educated person that they can attract.

Under the job competition approach, the educational requirements for jobs will rise as the average level of education in the job queue rises. That is, a worker can only improve his position in the queue and his prospective earnings by obtaining relatively more education than others in the queue. Thus, while education can serve to redistribute opportunities among individuals by altering their positions in the job queue and among jobs, it can not change the productivity and earnings of the jobs themselves which remain relatively fixed. Accordingly, education can be used as a means of individual mobility without affecting the overall distribution of earnings or opportunities.

A related view of the relation between education and earnings is reflected in theories of labor market segmentation.[11] These theories argue that the effects of education will depend upon the distribution of educated persons among different labor markets. Labor markets are considered to be disparate in their functioning with profound differences between primary and secondary jobs. Primary jobs are those which are stable with substantial amounts of capital per worker and which have well-articulated career ladders and training opportunities. Secondary jobs are more likely to be temporary and seasonal with less capital and little opportunity for career mobility. Depending upon the race, sex, social class origin, and geographical location of the individual, he or she will have greater access to one of these segments. In particular, white males of European background from middle or upper class origins in urban areas will have the best opportunities to obtain primary jobs, and education will be

associated with higher earnings and career advancement in this segment. In contrast, non-whites, females, and persons from lower social class origins will be relegated primarily to the less stable and lower paying opportunities in the secondary labor market with little opportunity to acquire new skills or to advance. In that market, education yields very little economic advantage. The precise nature of different theories of labor market segmentation and their implications for the distribution of earnings and the relation between education and earnings will vary. However, they challenge the view that investment in human capital yields similar returns to individuals according to their productivity in the labor market as long as there are a number of discontinuous labor markets and the probability of participating in any one of them is not random.

The most complete challenge to the human capital interpretation of education and the distribution of earnings is that of the Marxists. Marxists view education as a means of reproducing the social division of labor for capitalist work enterprise that enables the capitalist to extract a surplus from the worker.[12] Schools are viewed primarily as a means for training individuals to compete for individual advancement, job security, and earnings increases by teaching them how to behave in the corporate, capitalist workplace. Just as students are divided against each other in the competitive process of schooling, so are workers divided against each other in the competition of the workplace. Earnings differences in the firm are determined primarily by the structure needed to provide incentives for stable work behavior and loyalty as well as to legitimate hierarchical differences

in authority. To a large degree the legitimation of these differences is established in the school where similar structures of authority and power prevail.

Accordingly, while differences in earnings may be associated with differences in education, the differentials are not functions of worker productivity but rather organizational requirements for obtaining predictable labor output from the workforce that will permit the maximum extraction of profit or surplus. As with the credentialing model, rises in educational attainments or equalization of such attainments will not necessarily create more nearly equal earnings among workers as a class, although individuals receiving more education will be likely to have higher earnings than those with less education. In support of the view that earnings are largely unrelated to individual skill levels, Marxists point to the lack of a strong statistical effect of differences in academic test scores on earnings as well as the much stronger effect of educational credentials themselves on occupational positions and earnings.[13]

While a fuller presentation and discussion of these theories would certainly be useful in ascertaining how differences in education create differences in earnings, the purpose of this paper is considerably more practical in its orientation. That is, without providing an explanatory theory for the findings, we will attempt to construct an appropriate methodology that can be used by planners to assess the limits and potential of particular educational reforms on equality of earnings. While the results will surely depend upon

the underlying relationships, the purpose of this approach is not to test the explanatory power of different theories as much as to derive the planning implications for equality of different educational practices and alternatives. In the next section the conceptual framework for making these assessments will be presented.

III. CONCEPTUAL ISSUES

The purpose of this section is to set out the rationale and conceptual framework for estimating the equalization potential of education on earnings. It is important to set out two initial restrictions which will limit somewhat the results. First, the focus of the analysis will be on the relations between education and labor earnings rather than on education and income. Labor earnings constitute only one portion of income, that attributible to wages and salaries. Income derived from the ownership of property such as income from rents, interests, dividends, and royalties will not be included in the earnings measure. The principal reason for limiting the analysis of educational equalization to its impact on earnings is that presumably the connection between education and income is due primarily to the relation between education and the wage or salary income of a person from labor rather than the amount of property that he or she owns. Ownership of property is more likely to arise from inheritance or high income that exceed consumption than the educational level of a person. Of course, to the degree that higher levels of education provide access to occupations where individuals can obtain and utilize information on more lucrative investments or can influence such matters as government decisions that will affect the

value of their private property, education could provide greater incomes from property as well as from earnings.

In addition to the theoretical reason for restricting the economic measure to earnings, there is also a practical reason. Since the empirical data for assessing equalization impacts will be based primarily on survey data in which respondents are asked to provide information on their educational attainments, backgrounds, occupations, and earnings, the results are dependent crucially on the accuracy of the data that are collected. It is reasonable to believe that respondents will provide more accurate information on their earnings than on income from other sources. Wages and salaries are received at less frequent intervals. Perhaps, even more important, respondents are more likely to reveal the amounts and sources of their wealth than they are their earnings, the latter being imputable from their occupations. Matters of family secrecy, questionable dealings, income tax evasion , and other factors tend to impart less precision to the reports of such information.

By limiting the analysis to changes in the relative equality of earnings, it is important to recognize that we will not be treating the very serious inequalities created by the concentration of wealth. The highest incomes in any capitalist society are derived from the ownership of property rather than from wages and salaries. While income from property wealth may represent only a third or less of total income as it does in the advanced capitalist societies, it accounts for almost all of the income of the richest income receipients. Accordingly, even if educational equality were able to reduce

inequality in earnings substantially, it would not be likely to have a powerful equalizing effect on wealth and the income received from the ownership of property. It is only by making the distribution of capital, itself, more equal that the income produced by capital will be spread more equally across the population.[14] That particular strategy will not be addressed by the educational analysis in this paper.

A second restriction of the analysis is that it will be applied only to male populations. If we are to view the effect of education on equalizing earnings of adults, then we must face the problem that many females do not participate in the labor market or they participate for only limited periods of their lives. In contrast, the vast majority of men devote almost all of the period between the end of their schooling and the onset of old age to productive employment in labor markets. The result of these differences is that it is more nearly valid to use earnings as a measure of the equalizing effects of schools for males than for females. However, the restriction of the analysis to males is based only on this practical consideration rather than any moral imperative.

In summary, the two initial restrictions of this analysis will be the emphasis on the equalization effects of education on the labor earnings of males. Neither income received from the ownership of property nor the equalization effects of education for females will be treated in this paper. However, it is important to note that the basic approach could probably be expanded to take account of both of the present restrictions by making certain assumptions about the non-market earnings of females and by incorporating other forms of income

into the analytic and empirical framework. However, these extensions will not be addressed in the present exercise.

Conceptual Framework

Before we can explore the effect of educational policies on the distribution of adult earnings, it is necessary to discuss a method for establishing these connections. If the differences in earnings between any two individuals or groups of individuals were constant over time, we could simply look at the earnings differences at any particular point in time and attempt to relate these to differences in education. However, a wide body of research has suggested that earnings vary considerably over the life cycle between persons with different levels of education and other characteristics.[15] Accordingly, it is necessary to take account of the differences in earnings over the entire life cycle among individuals and groups in order to ascertain the degree of inequality in earnings and the relation of that inequality to education.

This can be seen more clearly in the following example. Assume that we wish to explore the effects of education on explaining the earnings patterns of two adult males, one drawn from low socioeconomic origins and the other drawn from high socioeconomic antecedents. Two problems would confront us. First, while the male from more advantaged circumstances would likely have higher earnings, the earnings differences between the two men would vary over their working lives. In addition to annual fluctuations, we would probably find that the earnings gap between the two men tended to increase over the life span. Thus, the first challenge is to find some way to summarize the lifetime

earnings of each man by developing some overall measure that can be used as a basis for comparison. Second, the more advantaged male probably had more material and educational support from his family, greater schooling attainments, and better social connections for converting these assets into employment and earnings than the less-advantaged male. Accordingly, we need some way of separating these confounding and overlapping influences on earnings in order to ascertain the degree to which the differences in lifetime earnings between the two males are attributible to educational differences alone.

The first of these challenges can be resolved by converting the earnings patterns into "human capital values" so that the analysis can proceed by comparing the differences in human capital that are associated with different populations. This procedure can best be understood by referring to the definition of capital given by Irving Fisher:

> Capital in the sense of capital value, is simply future income discounted or in other words, capitalized. The value of any property, or rights to wealth, is its value as a source of income and is found by discounting that expected income. (I. Fisher, 1930:12-13).

Just as any earnings stream from a physical asset such as a machine, a building, or a piece of land can be assessed according to its capital value, so can an earnings stream associated with human characteristics. In this analogy, the capital value of a person (to himself) can be assessed by knowing his future earnings power. Differences, then, in the amount of future earnings power will be reflected in differences in human capital values. In general, a public policy

attempt to equalize earnings can be evaluated according to the degree to which it more nearly equalizes the distribution of estimated human capital, since capital values are derived directly from expected future earnings.

In order to see the implications of this method, it is worthwhile to draw an analogy with assessing the capital value of other types of assets. For example, assume that there exists a piece of land that yields an annual income of $5000 a year. That is, $5000 a year is the value of the annual earnings stream. Unlike that of the human being, we will assume that the piece of land has an infinite life and that the earnings are constant from year to year. In contrast, the earnings of a human will vary from year to year and over the life-cycle, and the human being will have a finite earnings period. Just as we might ask what a human being is worth in terms of his human capital value, we shall ask what is the capital value of this piece of land?

Stating the question in a different way, we would ask: What is the value of an asset that will produce an annual income of $5000? Once the question is stated in this way, we might look at assets whose earnings are associated with a similar degree of riskiness to ascertain their investment return. For example, assume that such investments provide an annual return of 10 percent. This means that a $100 asset would provide an annual income of $10.00. Given such a 10 percent return or interest rate, it would take an investment asset of $50,000 to provide an annual income of $5000, and we would conclude that a piece of land that would provide $5000 a year is worth about $50,000.

To return to the human capital accounting case, we wish to estimate a capital value for human earnings that would represent a summary measure of the present value of the human asset for any stream of future earnings. By observing how the earnings patterns would change as a function of educational level, it would be possible to ascertain how educational differences alter human capital values. In this way, we can assess the potential of such educational changes, as narrowing the differences in schooling attainments between advantaged and disadvantaged, for altering the distribution of human capital between the two groups. That is, the second challenge of attempting to single out the equalizing effect of education in contrast with other influences in determining human capital differences can be accomplished by determining how different educational and other factors contribute to the patterns of lifetime earnings for the different groups. Just as total earnings patterns can be converted into human capital values by capitalizing the value of the earnings stream, so can particular components of earnings be capitalized such as those attributible to educational influences. In this way, particular policies designed to equalize educational attainments between groups can be evaluated for their potential effects in equalizing human capital between the two groups.

In summary, the method that has been chosen in this study for assessing the potential of educational policies for reducing inequality in adult earnings can be divided into two steps. First, the degree of inequality between two representative individuals can be determined by capitalizing the expected future earnings of each in order to construct human capital values that can be readily compared. In essense,

these represent estimated asset values of their earnings streams. The ratios of these human capital values or the differences between them can be used to assess the degree of earnings inequality.

But, this method will only provide a measure of the overall inequality between the individuals under scrutiny and the populations that they represent. To ascertain the effects of educational policies on reducing these inequalities, it is necessary to know how changes in the educational attainments between the comparison groups or individuals will alter the levels of human capital. This can be done by estimating statistically the effects of education on earnings streams and converting these effects into human capital values. That is, if the effect of an additional year of schooling on lifetime earnings patterns can be ascertained, then the effect of an additional year of schooling on augmenting an individual's human capital can also be estimated. Such a procedure can be used to determine how much of the human capital inequality gap would be closed by improving the relative educational attainments of persons in the less-advantaged population. More generally, changes in educational patterns among the different populations could be translated into changes in the human capital reflected in those populations. Thus, one could evaluate the equalizing effects on human capital of such policies as raising the minimal educational requirements or equalizing educational attainments between groups.

Before proceeding to the details of the methodology and its application, it is important to note how this approach to measuring human capital differs from the standard one that is reflected in most of the human capital literature. The great body of work on human

capital limits the definition of human capital to investments in health, education, training, and other human activities which will increase future earnings.[16] That is, the notion of human capital is tied to those changes in human characteristics deriving from an investment process rather than to the set of characteristics that produce future earnings. The value of human capital is determined by the value of the investments in these areas rather than by the value of the earnings streams. We will call this the standard approach in order to differentiate it from the method used in this paper which will be termed the capitalization or Fisherian approach (after Irving Fisher).

The capitalization or Fisherian approach assumes that any human characteristic that contributes to future earnings has a capital value. If differences in strength, beauty, health, native abilities, race, and social class origins, to name a few human traits, create differences in earnings of adults, then each of these represents a form of human capital even when no investment process is evident. Under the standard approach, only those characteristics which have been derived from an investment process have capital value, while under the definition used in this paper the capital value is derived from the earnings potential of the characteristic rather than the process by which it was acquired.[17]

These differences can be seen clearly in the following example. Suppose there exist two singers with identical talents and earnings, but one of them acquired his singing proficiencies by investing $10,000 in vocal lessons while the other had no training whatsoever.

Under the standard approach to valuing human capital according to its investment value, only the first of these two individuals would be considered to have human capital by virtue of his $10,000 investment. But, under the criterion that is used here, the two persons would have identical amounts of human capital from their singing talents as long as the earnings that were generated by these talents were identical. The actual method of acquisition is not a relevant criterion for determining the value of any human characteristic which generates earnings. Rather, it is the earnings themselves that determine the human capital value.

One further note of interpretation is important. The notion of human capital that is used here and its analog with physical capital is useful only in an accounting sense. That is, this approach to measuring human capital is intended only to provide a summary measure of its value rather than to provide an analytical category that is similar to physical capital. Although a person may have human capital value in generating future earnings, he will not have the options of a capitalist in the sense of someone who owns physical capital. This point is rather obvious. In order to realize his potential earnings, he must work. In contrast, a person with an equal amount of physical capital need not work to realize the same income. Further, short of slavery it is not possible to sell human capital as a commodity, that is to translate it into other asset forms or use it as a basis for speculation. In contrast, physical capital has a market in its capital form, and it can be exchanged for other assets or acquired for purposes of buying and selling and speculation. A per-

son who owns $100,000 worth of property is very much a capitalist whose income from that property is not dependent upon his labor. A person who owns $100,000 of human capital as measured in the Fisherian manner is very much a worker whose income is dependent upon finding work and providing labor services that will yield the expected earnings stream. These two situations are hardly equivalent, and we should not be misled by the similarity in wording or the methods of calculating capital value between physical and human capital.

IV. ANALYTICAL STEPS

Up to this point it has been suggested that a human capital accounting approach can be used to ascertain the effects of different educational alternatives on the equalization of adult earnings among individuals or populations. The purpose of this section is to set out the various steps of the analysis in order to construct an empirical framework that will permit the assessment of different educational strategies on equalization. There exist six steps of the analysis: (1) selection of groups for equality comparison; (2) collection of data; (3) estimation of earnings functions; (4) conversion of earnings functions into net present values of particular characteristics; (5) simulation of different educational policies; and (6) interpretation of the results.

Selection of Groups for Analysis

Obviously, the first task that arises in exploring the consequences of particular attempts to reduce inequality is to select the groups that are the target of such efforts. In order to choose groups that will be the focus of an attempt to increase parity in adult earnings

through education and other policies, we must normally consider two premises. First, the inequalities must be unacceptably large, and second, they must be based on criteria which are not considered valid bases for inequality. In the first case, we are likely to see many inequalities in economic rewards among specific individuals and groups that are not considered large enough to be sources of concern. Even in the most egalitarian societies such as China, wages tend to vary in a ratio between five to one and ten to one within industrial enterprises.[18] Of course, these represent the extreme possibilities, and the differences between any two groups of workers are likely to be considerably smaller. But, the point is that most egalitarian policies are not designed to provide precisely equal incomes, but only more nearly equal ones. Some inequality is often considered to be acceptable or even desirable.

This can be seen more clearly if we consider the second criterion of whether the inequalities are justified? Most societies presume that some differences in earnings are justified by differences in work effort, productivity, risk-taking, responsibility, and so on. Further, differences between young workers and experienced workers are typically accepted on the basis of the greater proficiencies of the latter as well as the typically greater economic demands in supporting their families. In contrast though, it is rarely argued that these types of criteria would justify very large or unlimited differences in earnings, and they might not be considered valid bases for explaining systematic differences among certain groups. With respect to the latter categories, differences

in economic returns by social class origin, sex, race, ethnic group, tribe, and geographical region have been considered suspect categories that may not be justified by the criteria for inequalities that are considered to be acceptable.

Each society or individual must set its own criteria for determining which inequalities need redress and which ones should be permitted.[19] While it is not the purpose of this paper to address the basis for these decisions, it is clear that there are often consenses about the loci of inequalities which ought to be addressed by public policy. For example, if disadvantaged families (those with low income and parental education) tend to produce children who will also be disadvantaged in adulthood, while the opposite is true with respect to persons from more advantaged backgrounds, this is likely to be the object of scrutiny with respect to social redress. Similarly, large differences in economic outcomes between races, sexes, regions, and ethnic groups that are reproduced from generation to generation are likely to engender specific concerns about the causes of the inequalities and the role of education in redressing them.

What is more important is that the specific groups who will be the focus of the equality analysis must be chosen on the basis of the criteria that were suggested above. If the concerns are based on large differences in economic outcomes for persons drawn from different social origins, this focus must be stated explicitly along with a definition of the criteria for classifying persons into the different groups that will be compared. Thus, the first step in the analysis must be to answer the question towards which the investigation will be addressed:

Inequalities between which groups? The study must be designed to carry out its inquiries with these groups as the focus, so the rationale for selecting the groups and the working definitions of them must be as precise as possible.

Since a typical concern of liberal capitalist societies is that there is social mobility in the sense that there is no particular relation between the economic status of parents and their children, we will use the social class origins distinction as the focus for establishing the methodology of this paper. That is, regardless of the conditions of birth, it is generally accepted -- at least in theory -- that society's members should have an equal chance at such life rewards as occupational position and income. Even in a society with highly unequal occupational positions and earnings, it is argued that persons should have equal access to those attainments rather than the children of the rich and powerful having a monopoly on the better positions while the children of the poor and powerless are relegated to impoverishment and marginality. Thus, one possible focus for considering the equalization effect of different educational policies would be to explore the degree to which they might close the gap between the expected earnings differentials of persons drawn from different social class origins. Presumably, a more equal distribution of educational benefits among students of different social class backgrounds would lead to a more nearly equal distribution of economic benefits among such groups.

While social class differences represent only one focus for this type of analysis, they will provide an illustration of how the methodo-

logy will be constructed. Once having established the social groups that will be the subject of the inequality and education analysis, it is necessary to define them in a careful way so that appropriate data can be collected. Thus, social class distinctions should be based on a clear statement of criteria with respect to those dimensions that comprise social class. Typical indicators of social class origins in a non-Marxian framework include measures of parental occupational attainment and status, income, and education. Within a Marxian framework the class distinctions would indicate one's relations to the means of production.[20] Whatever the definitions of groups, they should be as precise as possible for the ensuing empirical endeavor.

Collection of Data

Before discussing the collection of data, it is important to mention briefly the type of analysis that will be performed in the human capital accounting framework. Essentially, we need to know the levels of earnings and their determinants over the life-cycle for each of the groups represented in the inequality analysis. By knowing the levels of earnings over the life-cycle, we can impute a human capital value to them for comparison among groups. By knowing the determinants of earnings at different parts of the life-cycle, we can estimate the effects of differences in such characteristics as education, training, work experience, place of residence, and so on. In this way we can simulate the effects of changes in educational attainments between groups on human capital equalization.

While we will review this analysis in greater detail, it is important to set out two basic requirements for data collection, the

sampling design and the data specification and collection procedures. The sample must be representative of the populations that will be the subject of the comparison, and the sizes of the samples must be adequate to permit the estimation of earnings functions for the different age groups in each population. This means that attention must be given not only to the sampling of the appropriate populations, but also to the derivation of sub-samples of adequate size among the different age ranges of the population.

Given a sampling design, it is necessary to specify the types of information that will be collected for purposes of the analysis. In addition to the earnings levels of individuals, information must be obtained on those human capital characteristics that explain earnings. While these will depend on the specific nature of the equality comparison as well as the nature of the society for which the study done, one can think of these characteristics as those attributes of individuals which are determinants of their earnings. Typically, earnings functions studies have suggested that the most important determinants of earnings will include: (1) social class background factors which may reflect the quality of the home environment, nutrition, child care, and educational stimulation as well as connections in the job market; (2) race and sex which represent proxies for social and cultural differences in orientation and treatment as well as labor market discrimination; (3) geographical factors which reflect labor market structure; (4) educational factors including both qualitative and quantitative dimensions; (5) labor market experience and training; and (6) personal factors such as individual talents, attitudes, skills, and health status.[21]

The exact data that are gathered must certainly include useful information on the first five categories. The sixth category is problematic for a number of reasons. First, it is assumed that many of the individual talents, attitudes, and skills will be a product of social class background, education, and training so that these former attributes will capture them more economically than attempting to measure a myriad of traits on an individual basis.[22] Moreover, survey data often limit one to obtaining simple responses on a questionnaire rather than testing individuals with respect to their attitudes, values, skills, and cognitive knowledge. Even if such information could be obtained, it would be very costly relative to just collecting questionnaire responses.

A second reason for omitting the collection of highly detailed data on these traits is that where such data have been collected in previous studies, they have not yielded much additional explanatory information. The most prominent example of this is the use of standardized cognitive test scores in recent years for the explanation of earnings. Somewhat surprisingly, differences in test scores seem to have little statistical effect on earnings.[23] A recent study of a representative sample of adults in the United States found that only among white males were test scores of reading proficiency related to earnings, and a one standard deviation increase in reading scores (an increase from the fiftieth percentile to the eighty-fourth) was associated with only a three percent increase in earnings.[24] Accordingly, the overall picture with respect to the potential effects of education might be attainable without obtaining extraordinary detail

on the personal characteristics of respondents beyond the factors reflected in the first five categories.

Estimation of Earnings Functions

Substantial numbers of studies exist on the estimation of earnings functions, so the technical aspects of this endeavor will not be described here.[25] In general, a statistical earnings function takes the following form:

$$(1) \quad \text{Earnings} = a + b_1 \text{ Education} + b_2 X_2 + b_3 X_3 + \ldots + b_n X_n + u$$

That is, annual earnings are considered to be a linear function of education, and other factors ($X_2 \ldots X_n$) that were discussed above. The b's represent the slope coefficients or the estimated effect of a unit change in each of the explanatory variables on annual earnings, and u represents the unexplained variance in earnings or the residual. Of course, the equation can also be estimated using non-linear functional forms.

Recall that our purpose is to first estimate the human capital value or present value of the lifetime earnings of the groups that we wish to compare in order to ascertain the overall gap in estimated human capital between the groups. This can be done by knowing the average earnings levels at different points in the life-cycle for each group, information that is readily available in the data set. But, the purpose of the earnings functions is to provide an estimate of the contribution to human capital represented by the different amounts of each human capital characteristic possessed by each group, including the contribution of education. This means that we need estimates of

the earnings attributible to different levels of each characteristic or explanatory variable of the earnings function at different points in the life-cycle for each group. In this way, we can capitalize the annual earnings attributible to each characteristic over the life-cycle in order to obtain its contribution to estimated human capital for each group.

In order to fulfill this requirement, the data samples for each group must be stratified according to age, and separate earnings functions must be estimated for each classification. By obtaining the earnings coefficient (b) for each explanatory variable at a number of points over the life-cycle, it will be possible to estimate the stream or flow of earnings for a representative individual over the life-cycle for any level of education or other characteristic. Of course, these estimates must be done separately for each group, since not only the levels of the characteristics are likely to vary between groups but also the effects of those characteristics on earnings. We must bear in mind that some of the differences in earnings and human capital values will be due to different amounts of human capital characteristics possessed by the groups, while some will be due to the differences between groups in their ability to translate those characteristics into earnings. For example, persons drawn from higher social class origins are likely to possess both higher education levels and higher earnings for each year of education by virtue of their access to better jobs.

In summary, the earnings analysis will entail the derivation of earnings functions, by age, for each group so that we will have three

types of data available for the construction of human capital values: (1) average earnings over the life-cycle, by group; (2) average ownership of human capital characteristics such as level of education and other factors that explain earnings, by group; and (3) estimated effects of each human capital characteristic on annual earnings over the life-cycle, by group. Given this information, it is possible to estimate the human capital values of the annual earnings as well as to ascertain the human capital contributions to these human capital values. Further, it is possible to simulate alterations in educational attainments between the groups to estimate the proportion of the human capital gap between the two groups that would be closed by a more equitable educational result.

Conversion of Earnings into Human Capital Values

The conversion of a stream of earnings into a human capital value requires knowledge of the earnings stream and a discount rate which reflects the relative valuation of income or time preference for income. The standard expression for capitalizing such a stream of earnings to determine their present value (or in this case their human capital value) is represented by (2).

$$(2) \quad HC_i = \sum_{t=1}^{n} \frac{E_{it}}{(1+r)^t}$$

This expression defines the human capital of the i'th group (HC_i) as the summation of the earnings of the i'th group appropriately discounted by (1 + r) where r is that discount rate which expresses the time preference for income. The term t represents the year in which

the earnings are received so that for the first year of the earnings stream, t = 1, and the final year of the earnings stream, t = n, represents the last year in the life-cycle when earnings will be received because of subsequent death or retirement.

The average amount of human capital in each group that represents the basis for the overall inequality comparison can be evaluated by calculating the results for expression (2) with the average annual earnings for each group over the life-cycle. This requires selecting an age which reflects the beginning of adulthood such as age 18 so that the human capital estimates might reflect the human capital value of earnings received between ages 18 and 65. The specific interest rate that is chosen for the calculations depends upon a number of criteria which are too complex to discuss here.[26] However, typically rates between 5-15 percent are used in these types of evaluations. Based upon the application of expression (2) to the annual earnings data for each of the comparison populations, it is possible to calculate the amount of human capital possessed by an average 18 year old in each population. It is the gap between these human capital values that will be the focus of the subsequent analysis with the expectation that a more nearly equal educational attainment between groups will reduce the human capital differences.

However, the question that arises is how much of the human capital gap between groups would be closed by any particular educational result. In order to answer that question, we need to know the increment in human capital for each group that is associated with additional education. For example, let us assume that the average

18 year old drawn from lower socioeconomic origins has only about half of the estimated human capital of an average 18 year old drawn from higher origins. Further, most likely we will find that part of the reason for this difference in human capital (and the earnings from which it is estimated) is that the youth from the lower social class background has received less education. That is, while the youth from poorer origins is likely to droup-out of primary or secondary school, the one from higher social class origins is likely to go to the university (a factor that will be reflected in both lower earnings and more education in the years between 18 and 24 for him).

Accordingly, we wish to know how a more equal set of educational attainments will reduce the human capital gap between the two groups. In order to answer this question, it is necessary to know the human capital value of additional education for the less advantaged person to see how more years of education will add to his human capital and reduce the disparity between him and his counterpart from the more advantaged group. This can be calculated by estimating the value of (3).

$$(3) \quad \Delta HC_{1_i} = \sum_{t=1}^{n} \frac{b_{1_{it}}}{(1+r)^t} - \sum_{t=1}^{m} \frac{E_{it}}{(1+r)^t}$$

Expression (3) tells us that the change in human capital from an additional unit of education for an 18 year old in the i'th population will be determined by the present value of an additional unit of education as determined by the summation of the estimated regression coefficients over the life-cycle from the earnings functions at each age level, appropriately discounted, less the summation of any annual earnings lost in obtaining that additional unit of education. In this

case, ΔHC_{1_i} represents the additional human capital for an increment of education for a person in the i'th population; $b_{1_{it}}$ represents the earnings coefficient for an additional unit of education for a person in the i'th population at time t; m represents the number of years of earnings that would be foregone to obtain another unit of education; E_{it} signifies the earnings of the average person in the i'th population at time t; who does not receive the additional increment of education and all other symbols are consistent with those in the previous expressions.

Of course, to the degree that a person undertaking more schooling received part-time earnings, only a portion of E_{it} would be deducted in (3). But, by changing the educational attainments between the two groups in this manner, it would be possible to ascertain the consequences for equalizing their human capital values. Indeed, a more nearly equal educational outcome between groups could be assessed to determine the probable impact on reducing the gap in human capital between the two groups. It might also be added that policies for raising the earnings associated with any given level of education such as the reduction of discrimination or other possible policies could also be analyzed for their effects on reducing the human capital.

Interpretation of Results

What kinds of policies might be simulated from the human capital estimates and human capital coefficients derived from the earnings functions? There are at least four types of educational policies that can be evalutated for their equalizing potentials: (1) minimal educational attainments; (2) raising education of lower

groups only; (3) compensatory education; and (4) equalizing educational attainments.

Minimal educational attainments would refer to a policy where an attempt would be made to require everyone to complete a particular level of schooling. For example, a requirement of high school completion might be evaluated. In that case, one would wish to evaluate the present distribution of schooling between the comparison populations and estimate the additional human capital for each population if everyone completed the minimal level that is being contemplated. One of the paradoxes of such a policy is that it may create greater inequalities under certain conditions. While it is true that the more advantaged populations will have higher proportions of their young people who will have already completed the minimal level that is being considered, it may also be true that the additional earnings for completing that level for the advantaged exceed the additional earnings that will be received by persons from disadvantaged background. That is, while more persons from disadvantaged backgrounds would receive additional education under this provision, the fewer persons from the advantaged background who are affected may obtain greater increments to their human capital. Obviously, depending upon the portions of each group who would be affected and the human capital returns to each groups from meeting the contemplated minimum, the results in terms of human capital consequences could be equalizing or disequalizing.

By raising the attainments of persons from the lower group only, it would be possible to reduce the inequality gap in human capital. This type of educational policy might be evident in the case of attempts to reduce regional disparities in schooling by making more

schooling facilities available in areas that have deficiencies. Again, depending upon the degree to which the policy would raise the attainments of persons from the lower group relative to the upper one, it would be possible to estimate the degree to which such a policy would reduce the gap in human capital.

Compensatory education represents a policy of providing additional schooling resources for youngsters from economically disadvantaged populations to improve their educational attainments. Normally, this policy is reflected in an increase in educational expenditures on those groups. This means that increases in educational expenditures on the disadvantaged or on one group or race (e.g. rural or minority students) must be translated into their effects on earnings in order to establish a human capital impact. In recent years there have been attempts to ascertain the effects of additional expenditures on both test scores and on educational attainments.[27] In the former case it is possible to convert changes in test scores into human capital results if test scores are found to affect earnings. In the latter case, educational attainments are already included in all earnings functions, so the translation into human capital values of the results of compensatory educational spending on educational attainments can be readily accomplished.

The purpose of simulating educational equality between groups is primarily aimed at determining the potential of education for more nearly equalizing earnings. Obviously, while one can simulate on paper a condition of equal educational attainments between children from poor and wealthy families, between rural and urban families, or between minority and majority families, the ability of educational policy to obtain such results is far beyond the grasp of even the most optimistic educational planner or reformer. However, the exercise is still worthwhile because it will tend to indicate the degree to which inequalities are attributible to education in contrast with the degree to which they derive from other factors. For example, if such an exercise showed that equal educational outcomes between groups would reduce human capital differences by only ten percent, the equalization implications of educational policies would be viewed quite differently than if the exercise indicated that 80 percent of the human capital gap would be closed by such an approach.

It is important that appropriate weight be given to all causes of economic inequality in designing policies or in placing responsibility for existing inequalities. It is only in this way that educational policies can be balanced with other approaches in the search for greater equality. Accordingly, a test of the effects of full educational equality on human capital inequality would provide interesting and useful heuristic insights into overall strategies for achieving equality.

Accuracy and Robustness of Results

Obviously the accuracy and robustness of the results will depend crucially on a number of factors. Foremost among these are the quality of the data and the accuracy of the premises on which the estimates are made. It is difficult to discuss the quality of the data in an abstract fashion, since it is the specifics of the fit between the overall model of analysis and data that is important. However, it is possible to review certain aspects of this fit as well as the accuracy of the premises.

At least two premises are worthy of scrutiny. First, although the policies that are being evaluated assume large shifts in the supply of educated persons, the data are taken from the present situation in which at best one could assume that an increase in the education of one person might have the predicted human capital effect. Whether we assume a neo-classical theory of wages, a Marxian one, or one based upon segmented labor markets and job queue theories, it is clear that for large improvements in education among significant numbers of persons the results of our methodology would tend to overstate the additional earnings and human capital that they would derive. This means that the technique will tend to overstate the equalization effects of educational equality, for it is highly improbable that large increases in more educated categories would create the same additional individual earnings reflected in the present relation between education and earnings. For particularly large shifts in education among the less-educated groups, the measured equalization impact would be vastly overstated.

A second premise is that improvements in the amount of education of a particular group will be of about the same quality as that group has experienced in the past for all levels of educational expansion. However, rapid educational expansion may reduce educational quality with a possible reduction in the earnings implications of additional education relative to the effects of the present educational system. Of course, improvements in educational quality would mean that present estimates of earnings and human capital increases would be understated. However, deterioration in educational quality seems to be a more valid historical aspect of mass education and educational expansion.[28] Taken together it would seem that the reduction in earnings increments for each year of schooling associated with large increases in the supply of education as well as the tendency towards lower quality would mean that our estimates would overstate the equalizing effects on human capital of educational equalization.

A third premise derives from the tacit assumption that present lifetime earnings patterns associated with particular human capital characteristics will be maintained in the future. We have no way of evaluating the biases that might be implied by future earnings patterns deviating from present ones.[29] However, it is most likely that any substantial deviations should take place in the distant future rather than in the few years following the analysis (short of revolution or other cataclysmic changes in social and economic structures). Since future earnings are rather heavily discounted in the present value analyses, the overall estimates of

human capital will be remarkably robust to such changes as long as their impact is felt at least 15-20 years after the start of the period for which the calculations are made. Further, to the degree that future earnings patterns of all the comparison groups deviated from existing patterns because of common influences on them, it is not likely that the overall relations between the different streams of earnings would be altered systematically or substantially.

While changes in the shape of future earnings patterns may have relatively little influence on the human capital calculations for the reasons that were mentioned, any policy that would increase the supply of a particular type of educated labor could have a profound effect on decreasing the human capital value of that level of education. Since it is mainly the less advantaged groups that would be affected by this downward influence on earnings and human capital increments, educational equalization policies between advantaged and disadvantaged groups would tend to overstate the tendency towards human capital equalization associated with such policies. Thus, the measured equalization effects of such policies should be considered as an upper limit on the amount of human capital equalization that would take place. A more sophisticated study might attempt to reduce systematically the estimated earnings increments associated with educational equalization that provided large increases in the supply of educated labor. That is the tendency for downward pressure on wages and unemployment associated with an excess supply could be taken account of explicitly in the analysis by making certain assumptions about the elasticities of substitution of

different levels of educated labor in production.[30] The magnitude of these adjustments would be based upon criteria that have been discussed in the relevant research literature.

V. AN APPLICATION

In order to show how this approach might be applied to particular kinds of issues faced by educational planners, it is useful to provide some results from an illustrative study. The government of El Salvador wished to consider how loans might be used to provide greater equality of educational attainments at the secondary and university levels.[31] Since loans would be paid primarily from the additional earnings generated by the additional education, it was important to focus on the earnings and human capital value of the additional attainments. This also provided an opportunity to carry out the analysis according to the social class origins of persons to ascertain the degree to which equalizing educational results among social classes would equalize their earnings.

Differences in social class were derived primarily by using the educational levels of the parents as criteria. Based upon this measure, three social class groupings were determined. The restriction of the study to only those persons who were eligible for entry into the secondary level meant that the sample had to be limited to only those persons who had almost completed or completed at least the Basic Cycle of 9 years of schooling. It is important to note that since only a minority of persons achieves this much schooling in El Salvador (perhaps 25 percent of the school age population),

that persons completing the Basic Cycle are a relatively privileged group. This means that much of the inequality in El Salvador is found between this group and those who have less education, so the analysis of inequality within this group is an analysis within a relatively advantaged group for that country. Therefore, even the "low socioeconomic" group will be better off educationally than some three-quarters of the El Salvadorean population, and the equalizing effect of education will be tested only within that upper quarter of the population.

In order to obtain information on the earnings, education, social class background, and other characteristics that might affect earnings, separate surveys were undertaken of male employees in the public and private sectors.[32] The reason for choosing separate surveys for each sector was the expectation that earnings structures would be quite different between the two. Table One present estimates of the earnings by age group for each of the three socioeconomic (SES) categories as well as the human capital estimates. Annual earnings in colones are shown for each age range by SES level for both the public and private sector. These are summarized as human capital values in the column on the right.

Several observations can be noted from Table One. First, in both the public and private sectors, persons in the sample from higher SES levels have higher earnings than those from lower SES levels. Second, the earnings patterns between the two sectors show advantages at some ages and SES levels for the private sector

Table One -- Earnings at Different Ages and Human Capital Values of Earnings Streams at Age 18 for Males Working in the Public and Private Sectors in El Salvador (colones)

	Annual Earnings at Age:					Present Value Age 18-65
	14-19	20-24	25-34	35-44	45-54	HUMAN CAPITAL VALUE
PRIVATE SECTOR						
All Men	2292	4584	6672	7644	8892	53212
Low SES	1764	3180	6372	6545	7576	44438
Mid. SES	1968	3432	6324	8072	10368	49623
High SES	7536	14028	9348	10368	11244	106683
PUBLIC SECTOR						
All Men	2784	4260	7344	9360	10656	58509
Low SES	2712	4032	6756	7656	9000	52616
Mid. SES	2916	4224	7332	10620	10800	60408
High SES	2928	5208	9420	13632	13452	74892

Note: Present Values were calculated on basis of following formula:

$$\sum_{t=18}^{65} \frac{E_t}{(1+.10)^{t-17}}$$

This is the standard approach to estimating the present value of an asset. The interest rate that was used was set at 10 percent, and the earnings stream between ages 18 and 65 was utilized. The value of earnings for each year was interpolated between the midpoints of the age classifications set out above, and they were extrapolated to age 65 from the midpoint of the 45-54 year old category.

and at some ages and SES levels for the public sector. Third, the human capital values also reflect differences according to socioeconomic origins. One pattern of note is the very high human capital value for high SES males in the private sector relative to the other groups. Interestingly, older males in the high SES category in the private sector receive lower earnings than the high SES group in the public sector, while for younger males the opposite is true. Because the capitalization procedure penalizes incomes received toward the end of the working life relative to those received at the beginning, the human capital value of the earnings streams of high SES males in the private sector is considerably higher than that for the public sector.

Presumably some of the differences in human capital among the different socioeconomic groups is due to differences in education among them. Table Two confirms this pattern by presenting the percentage of males 25-34 years of age by SES whose education terminated at each level. The 25-34 year old category was chosen to reflect young males who had probably completed their educational experiences. Three levels of education are listed: Basic Cycle, Secondary, and University. In addition the careers of study at the secondary and university levels have been listed. While all those who have completed or almost completed the basic cycle only are shown at that level, not all of the persons shown in the secondary and university categories completed those levels. However, the average number of years of schooling completed in each field at each level was about the same for persons of different SES backgrounds with-

in each sector.

The distribution of education in Table Two suggests that at least some of the differences in estimated human capital among social classes is due to differences in educational attainments. For example, among private sector employees, over half of the low SES males achieved no more than the completion of the Basic Cycle, while only 13 percent of the high SES males had ended their education at that level. Over half of the high SES males in the private sector had attended the University, while only 15 percent of the low SES males had gone that far. Similar patterns are also reflected among public sector employees.

In order to know the effect on equalizing human capital of equalizing educational attainments among the SES groups, it is necessary to know the impact of changes in the distribution of education on the estimated values of human capital. This was done by estimating earnings functions, by age, for each SES group within the public and private employment samples. The results of these earnings functions were capitalized in order to ascertain the human capital value for any educational attainment for each SES group, by sector. Table Three shows the estimated human capital by educational level and SES for males at age 18.

As one reads down each column, one can see the present value of earnings of human capital value for a male in that particular group with a particular level and type of education. As one reads across the columns, one can ascertain the differences in human capital for any particular level of education among the

Table Two -- Distribution of Public and Private Sector Samples of Males, 25-34 Years of Age, by Level of Education and Socioeconomic Status
(percentage of group in each educational category)

	All males 25-34	Low SES	Middle SES	High SES
PRIVATE SECTOR				
Basic Cycle	41	51	25	13
Secondary:				
Academic	12	10	16	14
Commercial	3	4	2	0
Industrial	1	1	1	2
Accounting	13	11	18	13
Bookkeeping	6	6	8	4
Total	35	32	45	33
University:				
Administration	14	10	20	30
Engineering	3	1	5	14
Medicine	**	**	1	2
Humanities	2	3	2	2
Law	1	1	2	4
Total	20	15	30	52
PUBLIC SECTOR				
Basic Cycle	36	44	30	17
Secondary:				
Academic	7	8	6	5
Commercial	2	2	2	**
Industrial	1	1	1	**
Bookkeeping	4	4	4	**
Pedagogy	1	1	**	**
Others	4	4	3	**
Total	19	20	16	5
University:				
Administration	9	8	10	10
Social Sciences	6	5	8	10
Engineering	14	10	16	24
Pedagogy	1	1	1	**
Humanities	4	4	3	4
Physical Sciences	2	2	1	2
Law	3	2	3	7
Medicine	8	5	10	15
Total	47	37	52	72

Note: Column totals may not equal 100 percent because of rounding.

** indicates less than one-half of one percent.

Table Three -- Human Capital Values of Earnings for Males at Age 18 by Educational Level and Socioeconomic Status for El Salvador (colones)

	All	Low SES	Middle SES	High SES
PRIVATE SECTOR				
All Education Groups	53212	4438	49623	106683
Basic Cycle	36406	31994	36039	96298
Secondary:				
Academic	52570	44008	53188	102083
Commercial	40632	48446	43833	--
Industrial	47851	--	37124	--
Accounting	63854	59735	54840	38719
University:				
Administration	62350	48815	140873	
Engineering	94502	79521	80699	147898
Humanities	52011	59647	--	78052
Law	59352	--	56142	128290
PUBLIC SECTOR				
All Education Groups	58509	52616	60408	74892
Basic Cycle	40641	38697	41760	51453
Secondary:				
Academic	45420	43812	44528	48762
Commercial	33421	33493	33339	37696
Industrial	47161	39793	50778	51915
Pedagogy	40768	43503	55955	43400
University:				
Administration	72921	80829	62933	71184
Social Sciences	68678	65905	70159	72388
Engineering	78717	71855	75490	88516
Law	56581	50521	52334	62016
Medicine	57013	56908	55552	57795

Note: These values are estimated at age 18 using a 10 percent discount rate according to the following calculation for each educational level within SES group and sector.

$$\sum_{t=18}^{65} \frac{E_t}{(1+.10)^{t-17}}$$

Educational categories with few observations in the sample or with unreliable statistical results were omitted from the table.

various SES groups. From this table we can see that additional education raises the human capital value of representative individuals of each population. For example, while the average human capital reflected in the total private sample for all education groups was about 53,112 colones, those who completed only the Basic Cycle had earnings which had a human capital value of only about 36 thousand colones. Those who had studied at the secondary level had human capital values between about 41 and 64 thousand colones depending upon the field of study, while those who had studied at the University had earnings streams valued in human capital between 52 and 95 thousand colones. As we expected, there is generally a positive relation between the amount of education and the amount of human capital in these populations.

But, as we read across the table, a very interesting pattern emerges. With few exceptions, the high SES males are able to convert their education into substantially greater earnings and human capital than are those from the low and middle SES groups. For example, even at the Basic Cycle level the high SES male in the private sector is realizing a human capital value of over 96 thousand colones which is almost three times the human capital value associated with low and middle SES men who have achieved that level of education. Even more remarkable is the fact that the human capital value of this low level of education for high SES men in the private sector exceeds the human capital value for university-educated males from the low and middle SES

groups. Somehow the high SES male has advantages that yield him a high earnings stream and human capital value, even at the lowest levels of education in this sample. Possibly this reflects employment in family-owned or controlled businesses or the appropriate social connections to obtain the best jobs or other advantages which improve job opportunities. Whatever the cause, the implication is that equalization of educational attainments in itself will not provide equalization of human capital.

This can also be seen in the comparison of human capital values for high SES males with other males at the secondary level, where the high SES male has twice as high a human capital value as for the other groups. At the University level, the differential payoffs in favor of the high SES males are also evident. In only one case, that of the secondary accounting career is the return for the high SES males low, and this may be due to a statistical abberation. Where no figures are shown, the sample was so small that reliable calculations could not be made.

For the public sector the patterns are similar, but the differentials in human capital values among SES groups at the same educational level are much smaller. In all probability this greater degree of equality can be attributed to more nearly standard pay scales by educational level in the public sector as well as the likelihood that those high SES persons that lack good business and professional connections and other advantages in the private sector will obtain public sector employment.

In summary, the high SES male in both the public and private samples shows a human capital value greater than his low and middle SES counterparts for almost every educational attainment. This disparities are greatest among males employed in the private sector, but they are also present in the public sector. Accordingly, the equalization of educational attainments among the groups will not, in itself, equalize the human capital values of their earnings. But, it is crucial to determine how much of the human capital differences would be equalized by the achievement of equal education for the SES groups.

Table Four shows the estimated effects on reducing the gap in human capital among different social classes by equalizing educational attainments among them for each of the sectors. The educational distributions that were presented in Table Two were applied to the human capital for a representative of each group both before equalizing education and after equalizing education of the two lower groups with that of the high SES group.

Before equalizing educational attainments, the human capital values in the private sector varied from about 41,000 colones for the low SES males to about 113,000 colones for the high SES males. By applying the human capital values of each educational level for the low SES males to the educational attainments of the high SES males, the equalizing effect of education raises the estimated human capital for the low SES males in the private sector to 52,391 colones. Giving the middle SES males the education of high SES males raises their human capital to almost 60,000 colones.

Table Four -- Estimated Effects on Reducing the Gap in Human Capital Among Different Social Classes of Equalizing Educational Attainments

	BEFORE EQUALIZING EDUCATION		AFTER EQUALIZING EDUCATION	
	Estimated Human Capital (colones)	% of high SES	Estimated Human Capital (colones)	% of high SES
PRIVATE SECTOR				
High SES	112,782	100	112,782	100
Mid. SES	52,864	47	59,833	53
Low SES	40,770	36	52,391	47
PUBLIC SECTOR				
High SES	67,951	100	67,951	100
Mid. SES	55,214	81	59,942	88
Low SES	49,958	73	59,955	88

Note: Present Values are based upon applying the educational distributions in Table Two to the human capital values in Table 3 for each group.

But, it is obvious that while some equalization in human capital does take place, it does not have very much of an effect on the overall distribution of human capital among the groups. Because the high SES males seem to be able to convert the same level of education into much higher earnings than the other two groups, equal education among them does not come close to achieving equal human capital. As Table Four indicates, before equalization, the human capital of the middle SES group was about 47 percent of that of the high SES group and that of the lower SES group was only about 36 percent of the high SES one in the private sector. But, after equalizing educational attainments, the middle SES level of human capital rises only to 53 percent and the lower SES value to 47 percent of that of their high SES colleagues.

The simulation of the impact of equalizing educational attainment in the public sector shows a similar story, although the inequalities both before and after equalizing education are far less. While the middle SES males showed human capital values of 81 percent of the high SES males before equalization, they rose to 88 percent after simulating the effects of equal education. The lower SES group shows a rise from 73 percent to 88 percent.

In summary, among the three SES groups of these relatively, highly-educated males, the high SES persons had received more education than did those from lower SES origins. Further, the human capital value of education was greater for those from higher SES origins, with rather massive differences in the private sector and more modest ones in the public sector. When educational attainments

were equalized among the three groups, the estimated reduction in disparities in human capital was shown to be very minimal in both the public and the private sectors. Further, as we stated above, these simulations may overstate the true tendency toward equalization of earnings streams and human capital by not taking account of the downward pressure on wages exerted by substantial increases in the supply of educated labor.

However, Table Four also illustrates another interesting result. Even before equalizing educational attainments among the three SES groups, the distribution of human capital is far more equal in the public sector. That is, the human capital values for middle SES males is 81 percent of those of high SES males in the public sector before educational equalization in contrast with on 53 percent in the private sector after educational equalization. For low SES males the comparable figures are 73 percent before equalization in the public sector and 47 percent after equalization in the private sector. This pattern suggests that while the equalization of educational attainments among those persons at or beyond the completion of the basic educational cycle in El Salvador will have some equalization impact on earnings and human capital, the expansion of the public sector relative to the private one is likely to have a much more powerful equalization effect. It should also be noted that the expansion of the public sector will also tend to reduce inequalities in incomes from property. Of course, the efficiency of these types of shifts must also be explored, but the limits of educational equality on economic equality in the private sector is

certainly a finding that suggests a search for other equalization alternatives as well. Also, one must bear in mind that educational equalization in itself requires massive resources, so that any efficiency claims of educational investment ought to be scrutinized very clearly. The same care should be taken in evaluating efficiency claims of private versus public sector expansion, particularly under conditions where expansion of private sector investment is undertaken primarily through foreign investment and foreign control of economic activity. However, it is not the purpose of this paper to evaluate these claims directly, but to limit the exploration to the equalization potential and limits of education.

VI. SUMMARY

This endeavor began with the premise that many societies are characterized by substantial economic inequalities that are often considered to be a legitimate target of equalization. Within the mix of public policies aimed at more nearly equalizing economic outcomes, education is considered to be one of the more important strategies. Accordingly, it would seem that planners ought to have a method for assessing the equalizing impact of education on economic returns as well as to rank different educational strategies according to their equalization potential.

The purpose of this paper was to set out a methodology for carrying out such analyses, while illustrating them with a specific application. The focus of the methodology was the use of a human capital accounting procedure that utilized expected earnings streams to estimate human capital values. By providing estimates of the

determinants of earnings over the life-cycle among the groups that were foci of the equality analysis, it was shown that it is possible to estimate the effect of particular educational results and other changes in earnings on altering the human capital values represented among different populations.

There are two important outcomes of this type of research that should be useful to the planner. First, it is possible to evaluate educational strategies not only for their manpower consequences, but also for their equalization consequences relative to the costs of each strategy. At the present time, the distributional consequences of educational policies and plans are presumed rather than analysed in the selection of particular planning strategies. Second, this method enables an assessment of both the limits and potential of educational expansion and equalization for more nearly equalizing earnings and income in each society. As I have attempted to demonstrate in previous analyses, when educational planning and reform are directed towards altering characteristics of a society that derive from the basic political, economic, and social functioning and structure of that society, the educational reforms and plans will fail to achieve their stated objective.[33] To the degree that modern educational systems rose historically to reproduce the inequalities of capitalist and state socialist production relations, we should be skeptical that they can be used as a purposive tool of equalization policy.

The advantage of the methodology that has been proposed is that it can take available data and place those data in an analytical framework that enables one to assess the promise of education in alleviating inequalities. Surely, if the results are as pessimistic as those in the illustration for El Salvador or in a study of Singapore that has been completed,[34] the educational planner must begin to consider the limits of education for equalization rather than just its potential. Further, it may stimulate planners to look at the larger social, political, and economic context in which inequalities are derived when they set out to explore the characteristics and functioning of a more equitable and humane society. Educational change is not always the answer to defining and achieving these objectives. It may be a part of the solution, but hardly the driving force of change. This is one of the foremost political issues that can be partially evaluated by assessing the equalization potential of education within our present societies.

FOOTNOTES

1. See the data presentations in Adelman and Morris 1973, p. 153 and S. Jain 1975.

2. S. Kutznets 1955.

3. G. Becker 1964; T. W. Schultz 1961; J. Mincer 1970. An evaluation of the empirical support for the human capital approach is Blaug 1976.

4. A. Fishlow 1972 reviews the recent experience in Brazil, and Adelman and Robinson 1978 address the South Korean situation.

5. See the review of these countries in Carnoy 1978 and Carnoy et al., 1976.

6. Longitudinal comparisons for many countries can be found in S. Jain 1975.

7. For a review, see Mincer 1970.

8. Compare the data among age cohorts in Kotwal 1975 on educational patterns with the data on income distribution of Jain 1975. Psacharopoulos 1978 has presented statistical evidence across nations showing a tie between greater educational equality and income equality. However, one must be skeptical that such cross - sectional evidence provides predictive value for what will happen in individual nations as education becomes more equally distributed. The cross-sectional and cross-national data of Kuznets 1955 on the U-shaped relation between income and equality has not been supported over time. Typically, such studies ignore the fact that the degree of educational equality and income equality are governed by different forces among countries rather than all countries moving along a similar developmental spectrum. Also see Chiswick and Mincer 1972.

9. International Labour Organisation 1976: pp. 50-52 provides a discussion of the educated unemployed on a world-wide basis. For a consideration of "overeducation" see R. Freeman 1976 and R. Rumberger 1978. A dialectical explanation is found in H. Levin 1978. Other explanations for rising educational requirements of employers are I. Berg 1970; H. Braverman 1975; and L. Thurow 1975.

10. L. Thurow 1975.

11. Edwards, Reich, and Gordon 1975; Carter and Carnoy 1974; Doeringer and Piore 1961; Bluestone, Murphy, and Stevenson 1973.

12. Bowles and Gintis 1976; Levin 1978.

13. Bowles and Gintis 1976, Chap. 4.

Footnotes

14. Of course, wealth is even more unequally distributed than income. In the U.S. the wealthiest 6 percent of the population owns more than half of the Nation's productive wealth. See Joint Economic Committee 1976.

15. See for example, E. Cohn 1978, pp. 38-44; Blaug 1970, Chap. 2.

16. G. Becker 1964; T. W. Schultz 1961. In recent years there have been attempts to argue that even childrearing practices associated with income and other social class differences are in reality "investments" in human capital. See T. W. Schultz (ed.)., 1973 and A. Leibowitz 1974.

17. M. J. Bowman 1968 presents a useful discussion of different methods of valuing human capital. The present approach was developed in a series of papers. See H. Levin 1971, 1973, and 1975 and Levin and Liu 1973.

18. A discussion is found in C. Bettelheim 1975.

19. Obviously this statement is a highly academic one in that the agencies of social reproduction of a society tend to reproduce not only the inequalities, but also their legitimacy. Further, the political judgements on such matters will be conditioned heavily by the distribution of power in the society rather than by an academic quest for justice. However, see J. Rawls 1971 for such an academic discussion.

20. See, for example T. Bottomore 1966 and N. Poulantzas 1973 for differences in conceptual treatment of social class. Appropriate measurement of social class categories in a non-Marxist framwork is reviewed in H. Phelps Brown 1977 and Featherman and Hauser 1976.

21. For example, see Griliches and Mason 1972; Taubman and Wales 1973; Sewell and Hauser 1975; Jencks et al., 1972.

22. Jencks et al., 1972 has challenged this assumption in his attempt to explain the relatively low explanatory value of earnings functions equations.

23. See for example, Gintis 1971 and Griliches and Mason 1972.

24. Young and Jamison 1974, Tables 2 and 3.

25. See for example, Griliches and Mason 1972; Hanoch 1967; P. Taubman 1975; Bowles 1972; Mincer 1974.

Footnotes

26. Some of these issues are discussed in Baumol 1968.

27. A good example is J. Akin and I. Garfinkel 1977.

28. See H. Levin 1978 (forthcoming) for examples.

29. A discussion of some of the possibilities for error is found in R. Eckaus 1973.

30. See Bowles 1970; Dougherty 1972; and Thias and Carnoy 1972; and G. Johnson 1970-71.

31. The overall study of El Salvador was coordinated by M. Carnoy with financial support from the Inter-American Bank. The analysis that is presented here is taken from Chapter Five which was prepared by the present author. Further details can be found in the Report itself. See Center for Economic Studies 1977.

32. See Center for Economics Studies 1977, Chap. 1 and 2.

33. H. Levin 1977, 1978 and 1978a and Carnoy and Levin 1976.

34. Work to be published by H. Levin and Pak Wai Liu.

BIBLIOGRAPHY

Adelman, I. and Morris, C. Economic Growth and Social Equity in Developing Countries. Stanford:Stanford University Press. 1973.

Adelman, I. and Robinson, Sherman. Income Distribution Policy in Developing Countries; A Case Study of Korea. Stanford:Stanford University Press. 1978.

Akin, John S. and Garfinkel, Irwin. "School Expenditures and the Economic Returns to Schooling," Journal of Human Resources. Vol. XII, No. 4. Fall, 1977. pp. 460-481.

Baumol, W. J. "On the Social Rate of Discount," American Economic Review. Vol. 58. September 1968. pp. 788-820.

Becker, Gary S. Human Capital. New York:Columbia University Press. 1964.

Berg. Ivar. Education and Jobs: The Great Training Robbery. New York:Praeger. 1970.

Bettelheim, Charles. Cultural Revolution and Industrial Organization in China: Changes in Management and the Division of Labor. New York:Monthly Review Press. 1975.

Blaug, Mark. An Introduction to the Economics of Education. London: Penguin. 1970.

Blaug, Mark. "The Empirical Status of Human Capital Theory: A Slightly Jaundiced Survey," Journal of Economic Literature. Vol. 14. September 1976. pp. 827-855.

Bluestone, Barry; Murphy, William; and Stevenson, Mary. Low Wages and the Working Poor. Ann Arbor, Mich:The Institute of Labor and Industrial Relations. July 1973.

Bottomore, T. B. Classes in Modern Society. New York:Vintage Books 1966.

Bowles, Samuel S. "Aggregation of Labor Inputs in the Economics of Growth and Planning: Experiments with a Two-Level CES Function," Journal of Political Economy. Vol. 78. January/February 1970. pp. 68-81.

Bowles, Samuel S. "Schooling and Inequality from Generation to Generation," Journal of Political Economy. Vol. 80, No. 4, Part II. May/June 1972. pp. S219-S251.

Bibliography

Bowles, Samuel S. and Gintis, Herb. Schooling in Capitalist America. New York:Basic Books, Inc. 1976.

Bowman, Mary Jean. "Human Capital: Concepts and Measures," in Readings in the Economics of Education. Paris:UNESCO 1968. pp. 262 - 269.

Braverman, Harry. Labor and Monopoly Capital. New York:Monthly Review Press. 1974.

Carnoy, Martin et al. Can Educational Policy Equalize Income Distribution in Latin America? Geneva:International Labour Organisation 1976.

Carnoy, Martin. "Can Educational Policy Equalize Income Distribution?" Prospects. Vol. VIII, No. 1. 1978. pp. 3-18.

Carnoy, Martin and Levin, Henry M. The Limits of Eduational Reform. New York:David McKay and Co., Inc. 1976.

Carter, Michael A. and Carnoy, Martin. "Theories of Labor Markets and Worker Productivity," Menlo Park, CA:Portola Institute. August 1974.

Center for Economic Studies. Estudio De La Educacion Secundaria Y Superior En El Salvador, Las Tendencias En Los Requirimientos De Mano De Obra Con Educacion Secundaria Y Superior, Y Las Implicaciones Para La Politica De Educredito. Palo Alto,CA:Center for Economic Studies. December 1977.

Chiswick, Barry and Mincer, Jacob. "Time Series in Personal Income Inequality in the United States from 1939, with Projects to 1985," Journal of Political Economy. Vol. 80, No. 2. Part II. May/June 1972. pp. S34-S66.

Cohn, E. The Economics of Education, revised edition. Cambridge, Mass: Ballinger Press, 1978.

Doeringer, Peter and Piore, Michael. Internal Labor Markets and Manpower Training. Lexington, Mass:Heath Lexington Books. 1971

Dougherty, C.R.S. "Estimates of Labor Aggregation Functions," Journal of Political Economy. Vol. 80. November/December 1972. pp. 1101-1119.

Eckaus, Richard. Estimating the Returns to Education: A Disaggregated Approach. New York:McGraw Hill Book Co. 1973.

Bibliography

Edwards, Richard; Reich, Michael, and Gordon, David (eds). Labor Market Segmentation. Lexington, Mass:Lexington Books. 1975.

Featherman, David L. and Hauser, Robert M. "Prestige or Socioeconomic Scales in the Study of Occupational Achievement?" Sociological Methods and Research. Vol. 4, No. 4. May 1976. pp. 403-422.

Fisher, Irving. The Theory of Interest. New York:The MacMillan Co. 1930.

Fishlow, Albert. "Brazilian Size Distribution of Income," American Economic Review. Vol. LXII, No. 2. pp. 391-402.

Freeman, Richard. The Overeducated American. New York:Academic Press 1976.

Gintis, Herb. "Education, Technology and the Characteristics of Worker Productivity," American Economic Review. Vol. LXI, No. 2. May 1971. pp. 266-279.

Griliches, Z. and Mason, W. "Education, Income, and Ability," Journal of Political Economy. Supplement May/June 1972. pp. S74-S103.

Hanoch, G. "An Economic Analysis of Earnings and Schooling," Journal of Human Resources. Vol. 2, No. 3. Summer 1967. pp. 310-329.

International Labour Organisation. World Employment Programme: Research in Retrospect and Prospect. Geneva:ILO 1976.

Jain, Shail. Size Distribution of Income. Washington,D.C.:The World Bank 1975.

Jencks, Christopher et al. Inequality: A Reassessment of the Effect of Family and Schooling in America. New York:Basic Books 1972.

Johnson, George E. "The Demands for Labor by Educational Category," Southern Economic Journal. Vol. 37. 1970-71. pp. 190-204.

Joint Economic Committee, U.S. Congress. Broadening the Ownership of New Capital: ESOPs and Other Alternatives. 94th Congress, 2d Session. Washington, D.C.:Government Printing Office 1976.

Kotwal, Marilyn. "Inequalities in the Distribution of Education Between Countries, Sexes, Generations, and Individuals," Education, Inequality, and Life Chances. Vol. 1. Paris:OECD 1975. pp. 31-108.

Bibliography

Kuznets, S. "Economic Growth and Income Inequality," American Economic Review. Vol. 45. 1955. pp. 1-37.

Leibowitz, Arleen. "Home Investments in Children," Journal of Political Economy. Vol. 82, No. 2, Part II. March/April 1974. pp. S111-S131.

Levin, Henry M. "The Dilemma of Comprehensive Secondary School Reforms in Western Europe," Comparative Education Review. October 1978. forthcoming.

Levin, Henry M. "Educational Opportunity and Social Inequality in Western Europe," Social Problems. Vol. 24, No. 2. December 1976. pp. 148-172.

Levin, Henry M. "Equal Educational Opportunity and the Distribution of Educational Expenditures," Education and Urban Society. Vol. V, No. 2. February 1973. pp. 149-176.

Levin, Henry M. "The Human Capital Approach to Financing Equality of Educational Opportunity," Part One of a Report to the New York State Commission on the Quality, Cost and Financing of Elementary and Secondary Eduation. Stanford, CA:1971.

Levin, Henry M. "The Limits of Educational Planning," Paper presented at Conference of International Institute for Educational Planning on "Future of Educational Planning," June 19-25, 1977. To be published in a volume edited by Hans Weiler.

Levin, Henry M. "Qualitative Planning: A Broad View," Educational Planning: Towards a Qualitative Perspective, R. S. Adams (ed) Paris:International Institute for Educational Planning 1978. Chap. IV. 1978a.

Levin, Henry M. "Some Methodological Problems in Economic Policy Research Determining How Much Should Be Spent on Compensatory Education," Education and Urban Society. Vol. VII, No. 3. May 1975. pp. 303-333.

Levin, Henry M. Workplace Democracy and Educational Planning. Paris: International Institute for Educational Planning 1978.

Levin, Henry M. and Liu, Pak Wai. "The Economics of Human Capital," unpublished draft. October 1973.

Bibliography

Mincer, Jacob. "The Distribution of Labor Incomes: A Survey with Special Reference to the Human Capital Approach," The Journal of Economic Literature. Vol. VIII, No. 1. March 1970. pp. 1-26.

Mincer, Jacob. Schooling, Experience and Earnings. New York:National Bureau of Economic Research 1974.

H. Phelps Brown. The Inequality of Pay. Berkeley:University of California Press 1977.

Poulantzas, Nicos. Political Power and Social Classes. London:New Left Books, 1973.

Psacharopoulos, George. "Inequalities in Education and Employment," Paper presented for seminar on "Inequalities in Educational Development," International Institute for Educational Planning, Paris. November 27-30, 1978.

Rawls, John. A Theory of Justice. Cambridge, Mass:The Belknap Press 1971

Rumberger, Russell W. Overeducation in the U.S. Labor Market. Unpublished doctoral disseration. School of Education. Stanford University. July 1978.

Schultz, Theodore W. "Investment in Human Capital," American Economic Review. Vol. 51, No. 1 March 1961. pp. 1-17.

Schultz, Theodore W. "New Economic Approaches to Fertility," Journal of Political Economy. Vol. 81, No. 2, Part II. March/April 1973.

Sewell, William and Hauser, Robert. Education, Occupation and Earnings: Achievement in the Early Career. New York:Academic Press 1975.

Taubman, Paul. Sources of Inequality in Earnings. Amsterdam:North Holland Publishing Co. 1975.

Taubman, Paul and Wales, Terence. "Higher Education, Mental Ability, and Screening," Journal of Political Economy. Vol. 81, No. 1 January/February 1973. pp. 28-55.

Thurow, Lester. Generating Inequality. New York:Basic Books 1975.

Thias, H. and Carnoy, M. "Educational Planning with Flexible Wages: The Case of Kenya," Economic Development and Cultural Change Vol. 20, No. 3. April 1972. pp. 438-473.

Young, Kan-Hua and Jamison, Dean T. "The Economic Benefits of Schooling and Compensatory Reading Education," Princeton, N.J.:Educational Testing Service. December 1974. mimeo.